

# Notes on the breeding ecology and conservation of the Critically Endangered Dwarf Olive Ibis *Bostrychia bocagei*

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**Notes sur la nidification et la protection de l'Ibis de Bocage *Bostrychia bocagei*, espèce « Gravement menacée d'extinction ».** Des données sont présentées sur la nidification de l'Ibis de Bocage *Bostrychia bocagei*, y compris la première description du nid et des œufs. Cette espèce endémique de São Tomé a besoin des mesures de protection urgentes.

**Summary.** We present information on the breeding ecology of the Dwarf Olive Ibis *Bostrychia bocagei*, including the first description of the nest and eggs, and discuss the need for urgent conservation measures to save this São Tomé endemic.

**D**warf Olive Ibis *Bostrychia bocagei* is the world's smallest ibis and probably also the most threatened, being classified as Critically Endangered (BirdLife International 2013). It only occurs in some of the best-preserved patches of lowland forest in southern São Tomé. Some authors do not regard it as a species (Jones & Tye 2006), but there have been no recent attempts to clarify its affinities using molecular techniques (Melo & Jones 2010).

The taxon was discovered in the late 1880s by the Portuguese collector Francisco Newton, and first described by Bocage (1889a,b). There were few records in the 20th century, nearly all of them in the island's southern forests. Recent observations outside the species' known distribution require confirmation, but its range undoubtedly has been greatly reduced through habitat loss (Jones & Tye 2006). Most known localities lie within the recently created Obô Natural Park and are protected by their natural inaccessibility (Fig. 1). Hunting is probably the greatest threat, with regular reports of birds being killed (Carvalho 2008, Álvares in press).

Little is known concerning its ecology. The species appears to prefer primary forest with an open understorey on more level ground, where it feeds, flushing into the trees if disturbed (Jones & Tye 2006, Leventis & Olmos 2009). Although it is thought to breed during the wet season, only two nests have been found (BirdLife International 2013) while a female collected in November had enlarged gonads (Jones & Tye 2006). Here we provide new data on the breeding ecology of Dwarf Olive Ibis, including the first description of its eggs and nest.

## Methods

São Tomé (00°25'–00°01'N 06°28'–06°45'E) is a small oceanic island of 852 km<sup>2</sup> (Jones *et al.* 1991) that holds 20 endemic bird species—a remarkable number given its size (Stattersfield *et al.* 1998). Half of these are currently threatened (BirdLife International 2013). Many analyses have highlighted the island's outstanding biodiversity value (e.g. Collar & Stuart 1985, Myers *et al.* 2000, Buchanan *et al.* 2011), but little has been done to protect it (Balmford & Long 1995).

Our field work was centred around the ruined plantation houses of Monte Carmo. The area comprises old-growth forest with patches of secondary forest, mostly inside Obô Natural Park. An oil palm plantation is currently being replanted, threatening the long-term survival of these forests and the ibis, either directly or via other threats, such as hunting. We surveyed the area in September and December 2008, and April, July and November 2009, following predefined transects at a slow pace (Cullen & Rudran 2003). All ibis observations were registered using GPS. Nests were followed to collect data on breeding ecology.

## Results

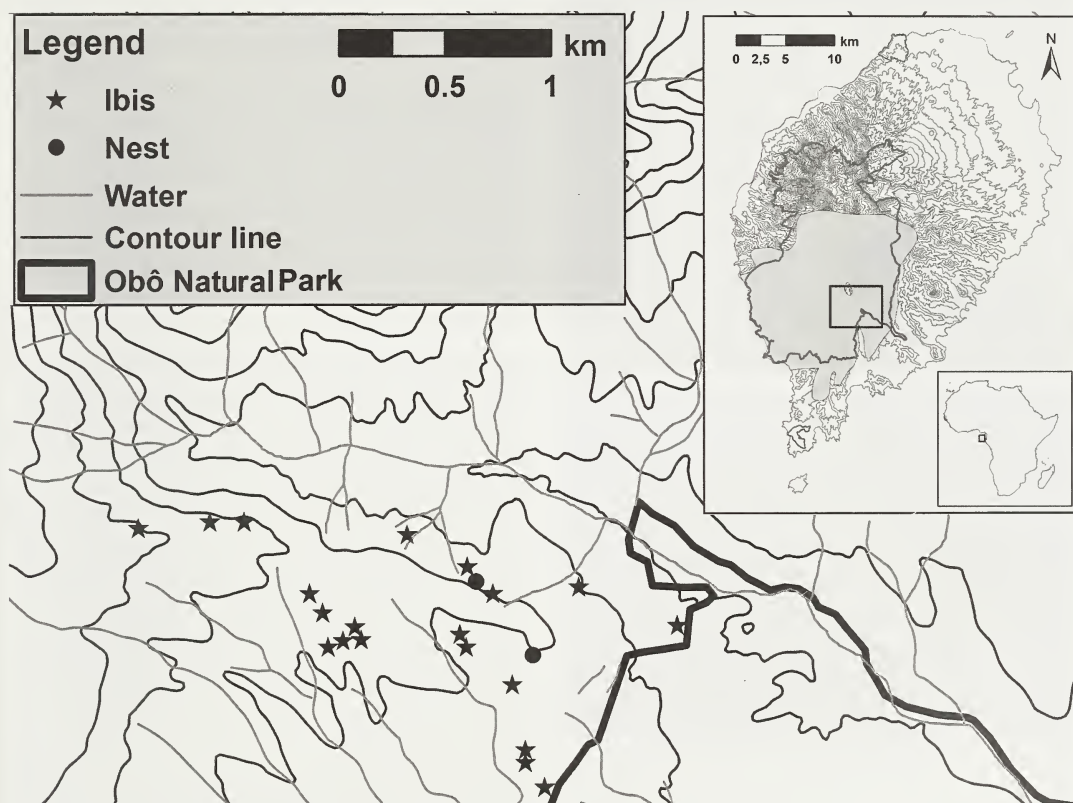
Dwarf Olive Ibises were recorded 54 times and proved reasonably easy to find and to be well distributed across the study area (Fig. 1). We found two active nests: the first on 22 November 2009 and the second on 29 November. Both had incubating birds, contained two eggs and were constructed on *Cleistanthus liberica* (Phyllanthaceae) trees (locally known as *viro*) (Fig. 2a). Nest 1 was 8 m above ground, nest 2 was 16 m up. On 20, 26 and

27 December the incubating birds left the nests on our approach, but when the nests were visited again on 13 February 2010, the only activity was a bird that departed nest 1. Since the nests were apparently not visited by the birds during the three subsequent days, we decided to collect them. Nest 1 contained two eggs, one intact, the other broken and with a discernible embryo (Fig. 2b). Nest 2 was empty. Both nests comprised small twigs and nest 1 also included unidentified fresh plant material; their diameters were 370 × 360 mm (nest 1) and 330 × 260 mm (nest 2). The interior of both nests was shallow and lined with

leaf litter, as well as both flight and down feathers. The intact egg measured 54.0 × 37.5 mm and was slightly off-white, with short, irregular, brown-violet lines and brown speckles (Fig. 2c). All of this material is currently housed at the 'Associação dos Biólogos Santomenses' collection, Instituto Superior Politécnico, São Tomé.

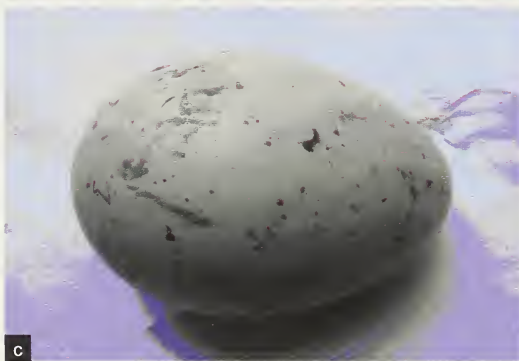
## Discussion

Dwarf Olive Ibis has the smallest range of any of São Tomé's endemic birds, it probably occupying significantly less than the 210 km<sup>2</sup> suggested by BirdLife International (2013; Fig. 1). The scarcity



**Figure 1.** Map of São Tomé showing the study area and distribution of Dwarf Olive Ibis *Bostrychia bocagei*. The inset shows the island's topography, the location of Obô Natural Park (blank polygon), the distribution of Dwarf Olive Ibis (grey-shaded polygon—adapted from BirdLife International & NatureServe 2011) and the location of the study area (blank rectangle). The maps were produced from Wojtusiak *et al.* (2006), under a Creative Commons non-commercial derived copyright license, and therefore can be used by future authors without specific permission but with due acknowledgement to the original authors (see <http://www.ggcg.st> and <http://www.creativecommons.org>).

Carte de São Tomé indiquant la zone d'étude et la distribution de l'Ibis de Bocage *Bostrychia bocagei*. La carte en cartouche montre la topographie de l'île, l'emplacement du Parc Naturel de Obô (polygone en blanc), la distribution de l'Ibis de Bocage (polygone gris—adapté de BirdLife International & NatureServe 2011) et la localisation de la zone d'étude (rectangle). Les cartes sont produites d'après Wojtusiak *et al.* (2006), sous la « Creative Commons non-commercial derived copyright license », et peuvent donc être reproduites sans autorisation spécifique, sous réserve de dûment mentionner la source (see <http://www.ggcg.st> and <http://www.creativecommons.org>).



**Figure 2.** (a) Adult Dwarf Olive Ibis *Bostrychia bocagei* at nest; (b) interior of nest with two eggs; (c) egg (Hugulay Maia)

(a) Ibis de Bocage *Bostrychia bocagei* adulte au nid; (b) l'intérieur du nid contenant deux œufs; (c) œuf (Hugulay Maia)

of records is presumably due to the restricted number of areas where the species occurs, as it appears reasonably common in our study area, although this is the best-known stronghold (Leventis & Olmos 2009).

Our discovery of active nests in November–December matches Correia's female specimen with enlarged gonads in November (Jones & Tye 2006). Dwarf Olive Ibis appears to nest higher above ground than congenics, e.g. Olive Ibis *B. olivacea* (4–8 m high: Hancock *et al.* 1992) or Hadada Ibis *B. hagadesh* (1–6 m high: Perez del Val 1996). This might reflect the availability of higher nesting sites, but also predation avoidance. Unlike other species in the *B. olivacea* group, Dwarf Olive Ibis does not necessarily appear to nest close to running water (Fig. 1). Nest failures might reflect predation by snakes or introduced mammals, such as rats *Rattus* sp. or Mona Monkeys *Cercopithecus mona*.

The endemic subspecies of Olive Ibis on the neighbouring island of Príncipe, *B. olivacea rothschildii*, became extinct, probably within the last century (Jones & Tye 2006). This demonstrates the vulnerability of forest ibis populations on small islands, and emphasises the need for urgent measures to conserve Dwarf Olive Ibis. In order for such measures to be effective, a better understanding of its distribution and abundance is required, as unidentified strongholds may exist in the rugged and little-visited centre of the island. It is also important to gain a better understanding of its ecology, including foraging, habitat selection and predators.

Some areas where the ibis occurs are becoming more accessible to hunters and other forest users, such as loggers and wine palm collectors, who might occasionally kill the species for food or contribute to overall habitat degradation. Its apparently clustered distribution and size make it particularly vulnerable to hunting, especially given the scarcity of large quarry species on the island (Carvalho 2008, Álvares in press). Any conservation measures should focus on working with those people who might hunt the birds. Given the apparent sensitivity of the species to disturbance, it is also advisable to control tourist access to sites where the species is known to occur, especially during the breeding season.

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